

SECTION 02600

WATER DISTRIBUTION SYSTEM IMPROVEMENTS

02600.1.0 GENERAL

02600.1.1 Work Included

- A. Water distribution system shall include but not be specifically limited to the installation of water main, fittings, valves, hydrants, services, etc.
- B. Water distribution system shall also include incidental related work such as clearing and grubbing, trench excavation, dewatering, rock removal, trench stabilization, bedding, select backfill material, backfill, compaction, tie-in of existing system, testing, disinfection, etc.
- C. The Contractor shall furnish all labor, materials, tools, equipment and all else required for and to construct the water distribution system improvements shown on the Drawings and Specified herein in complete accord with the Contract Documents.
- D. All supplementary or miscellaneous items, equipment, appurtenances, or devices necessary for or incidental to a complete and functional installation, whether or not shown on the Drawings or addressed in the Specifications, shall be provided and installed as part of the Work.

02600.1.2 Submittals

- A. Manufacturers' Literature: Submit properly identified manufacturer's literature including material specifications, test reports, maintenance and warranty information, and printed installation instructions for approval of the following: pipe, fittings, hydrants, valves, blowoffs, castings, vaults, and other special items required to complete the work.
- B. Shop Drawings: Submit shop drawings for approval of all precast concrete pipes, manholes, vaults, etc. Shop drawings should indicate all relative dimensions, appurtenances, and governing specifications.

02600.1.3 Regulatory Requirements

- A. All materials and construction shall be in accordance with the Permit issued by and all rules and regulations of the North Carolina Department of Environment, Health, and Natural Resources, Division of Environmental Health.

02600.1.4 Construction Record Drawings

- A. Contractor shall be responsible for preparing and submitting one (1) set of Drawings to the Engineer on which a record of the actual construction operations of all structures and piping systems on the project are shown. These construction drawings shall include all items installed for this Contract as well as pre-existing items. The Engineer shall verify to his satisfaction the construction information shown by the Contractor on the construction drawings. Thereafter the Engineer shall amend the Final Drawings to incorporate this construction record information. The Engineer shall then affix to each sheet of the Final Drawings the statement "RECORD DRAWINGS – Drawings revised to conform to construction records," sign and date each sheet. The Engineer shall then furnish to the City one (1) set of reproducible Final Drawings on mylar and one (1) electronic .dxf. file of the Final Drawings on a CD rom.

02600.2.0 PRODUCTS

02600.2.1 General

- A. This Products Section includes materials which may be used in the work herein described but is not intended to cover every item necessary for completion of the Work, nor is it intended that every item described below be included in every project. The intention of this Products Section is to denote the quality and type of materials desired and required for performance of the Work.
- B. All water mains installed as a part of the City of Rocky Mount water distribution system shall be ductile iron pipe complying with the standards listed below. Any connection to the water distribution system of the City of Rocky Mount shall be made using ductile iron pipe.

02600.2.2.0 Water Mains

- A. Ductile Cast Iron Pipe (DIP):

Ductile cast iron pipe used for water mains shall be manufactured in accordance with AWWA C150 and C151. The minimum class pipe shall be either Pressure Class 350, Thickness Class 50, or as designated on the Plans or in the Bid Schedule. Pipe shall be cement lined and bituminous coated for direct burial in accordance with AWWA C104. Ductile Iron may be used for any sewer main 8 inch in diameter or larger. Pipe shall be the either "push-on" or "mechanical joint" type for direct burial manufactured in accordance with AWWA C111.

02600.2.2.1 Water Service Pipe (3/4" Through 2")

A. Type K Soft Copper:

Copper tubing for service lines shall be Type K Soft Copper manufactured in accordance with ASTM B88 and supplied in continuous coils. A maximum of one compression or flared union shall be permitted for service lines 60 feet or less.

02600.2.2.2 Cast Iron Fittings

- A. All Cast Iron Fittings for direct burial shall be either Class 250 cast ductile or gray iron in accordance with AWWA C110 or Class 350 compact fittings cast from ductile iron in accordance with AWWA C153.
- B. Unless otherwise noted on Plans, all fittings for direct burial shall have mechanical joint connections. Unless otherwise noted on Plans, all fittings for vault installations shall have flange connections.
- C. All cast fittings for direct burial shall have a cement-mortar lining in accordance with AWWA C104 and shall be fully bituminous coated for direct burial.
- D. All cast iron fittings in vaults and pumping stations shall be drilled and faced for 125 lb. ASA flanges. All flanged joints shall be firmly bolted with machine bolts recommended by the latest AWWA Standard for flanged drilling. Gaskets shall be rainbow rubber or approved equal.

02600.2.2.3 Hydrant

- A. Hydrants shall be Dry-Barrel Type manufactured in accordance with AWWA C502 and shall be furnished with a six (6) inch mechanical joint inlet and minimum four and one half (4-1/2) inch main valve opening. Acceptable hydrants shall have a bronze valve seat with a bronze valve seat insert.
- B. Hydrants shall have Pentagon Shaped (5 Sided) Operating Nut and shall open turning left (counter-clockwise).
- C. Hydrants shall be Three-Way with One Each 4 1/2 inch pumper nozzle and Two Each 2-1/2 inch hose nozzles. All nozzles shall have National Standard Threads.
- D. Acceptable manufacturers for hydrants shall be American Darling, Kennedy, Mueller, Waterous, or approved equal.

02600.2.2.4 Gate Valves Up To Two (2") Inch

- A. Gate valves up to and including 2" in size, shall be screw-end, bronze or brass body, bronze mounted gate valves designed for a working pressure of 150 pounds per square inch, and having removable seats, discs, stem, stuffing box and gland.

02600.2.2.5 Gate Valves Two And One-Half (2-1/2") Inch Through Twelve (12") Inch For Direct Burial

- A. All gate valves for shall have mechanical joint connections except valve connections to tapping tees, which shall have a flange to mechanical joint connection. All valves shall be provided with a two (2) piece screw-type valve box.
- B. All gate valves shall open turning left (counter-clockwise). Valves shall have non rising stems (NRS) with 2 inch square (4 sided) operating nut. All operating nuts shall have the direction of opening cast on them.
- C. All gate valves two and one-half (2-1/2") inch through twelve (12") inch mains shall be Resilient-Seated type manufactured in accordance with AWWA C509 and shall be fully epoxy coated, twelve (12) mil minimum dry film thickness, which conforms to AWWA C550 latest revision. This coating shall be applied prior to valve assembly in order that all exposed external surfaces, including end connection bolt holes, body to bonnet bolt holes, etc., shall be coated. All gate valves shall have a minimum rated working pressure of two hundred (200) psi, four hundred (400) psi minimum test pressure.
- D. Valves shall have an unobstructed waterway when fully opened equal in diameter to at least 1/4" greater than the nominal valve size.
- E. Valves shall be provided with O-ring stem seals above and below the stem collar. The area between the O-rings shall be filled with lubricant to provide lubrication to the thrust collar bearing surfaces each time the valve is operated. One antifriction washer shall be located below and one antifriction washer above the thrust collar. All seals between valve parts such as body and bonnet, bonnet and bonnet cover, shall be O-ring seals.
- F. The valve seating mechanism shall provide zero leakage at the water working pressure when installed with the line flow in either direction. The valve seating mechanism shall consist of a cast iron gate having a vulcanized synthetic rubber coating with no rubber to metal seams or edges to the water-way when in the fully closed position. The valve seating mechanism shall be designed such that no sliding of rubber on the seating surfaces is required to compress the rubber. It shall also be designed such that compression-set of the rubber shall not affect the

ability of the valve to seal when pressure is applied to either side of the gate.

- G. The stem nut shall be independent of the gate and shall be provided with a spherical bearing surface to eliminate binding of the stem and to provide a self-aligning seating mechanism. The gate shall be provided with a drain in the bottom to flush the internal cavity of foreign material each time the valve is opened. All valves shall be seat-tested at the rated working pressure and self-tested at twice the rated working pressure in accordance with AWWA C509.
- H. All resilient seated gate valves shall be manufactured by American-Darling Company, Mueller Company or approved equal.

02600.2.2.6 Gate Valves Two And One-Half (2-1/2") Inch Through Twenty-Four (24") Inch For Vault Or Pumping Station Installation

- A. Valves for vault or pumping station installation shall be flanged, open left and either: 1) non-rising stem (NRS) with hand wheel operation; or 2) outside stem and yoke (OS&Y) with hand wheel operation.
- B. All gate valves two and one-half (2-1/2") inch through twelve (12") inch mains shall be Resilient-Seated type manufactured in accordance with AWWA C509 and shall be fully epoxy coated, twelve (12) mil minimum dry film thickness, which conforms to AWWA C550 latest revision. This coating shall be applied prior to valve assembly in order that all exposed external surfaces, including end connection bolt holes, body to bonnet bolt holes, etc., shall be coated. All gate valves shall have a minimum rated working pressure of two hundred (200) psi, four hundred (400) psi minimum test pressure.
- C. Gate valves shall have an unobstructed waterway when fully opened equal in diameter to at least 1/4" greater than the nominal valve size.
- D. Gate valves shall be provided with O-ring stem seals above and below the stem collar. The area between the O-rings shall be filled with lubricant to provide lubrication to the thrust collar bearing surfaces each time the valve is operated. One antifriction washer shall be located below and one antifriction washer above the thrust collar. All seals between valve parts such as body and bonnet, bonnet and bonnet cover, shall be O-ring seals.
- E. The valve seating mechanism shall provide zero leakage at the water working pressure when installed with the line flow in either direction. The valve seating mechanism shall consist of a cast iron gate having a vulcanized synthetic rubber coating with no rubber to metal seams or edges to the water-way when in the fully closed position. The valve

seating mechanism shall be designed such that no sliding of rubber on the seating surfaces is required to compress the rubber. It shall also be designed such that compression-set of the rubber shall not affect the ability of the valve to seal when pressure is applied to either side of the gate.

- F. The stem nut shall be independent of the gate and shall be provided with a spherical bearing surface to eliminate binding of the stem and to provide a self-aligning seating mechanism. The gate shall be provided with a drain in the bottom to flush the internal cavity of foreign material each time the valve is opened. All valves shall be seat-tested at the rated working pressure and self-tested at twice the rated working pressure in accordance with AWWA C509.
- G. All resilient seated gate valves shall be manufactured by American-Darling Company, Mueller Company or approved equal.

02600.2.2.8 Sixteen Through Forty-Eight (16"-48") Inch - For Direct Burial Use On Tapping Tees Only

- A. Gate valves shall be iron body, bronze mounted, double-disc parallel seated, fully bituminous coated that fully comply with the requirements of the latest revision of AWWA Standard C-500.
- B. Gate valves shall have minimum working pressure of one hundred and fifty (150) psi, three hundred (300) psi test pressure.
- C. All double-disc gate valves shall be manufactured by American-Darling Company, Mueller Company or approved equal.

02600.2.2.9 Butterfly Valve (16" and Larger)

- A. Unless otherwise shown on Drawings, all valves on water mains sixteen (16") inch in diameter and larger, except tapping valves, shall be rubber-seated, butterfly valves manufactured in accordance with AWWA C504. All butterfly valves shall be Class 150B minimum with a rated working pressure of one hundred and fifty (150) psi, three hundred (300) psi minimum test pressure.
- B. Unless otherwise noted on the Drawings, all butterfly valves shall be provided with either mechanical joint or "Victaulic", grooved end connections.
- C. Valves shall have ductile iron bodies and discs with full epoxy coatings, twelve (12) mils minimum, in accordance with AWWA C550. Valve seats shall be stainless steel, bronze matting, or resilient material. Resilient seats

shall be mechanically attached to the valve disc or body and shall be fully field adjustable by mechanical means. Valve disc shafts shall be stainless steel of either the stub or through-shaft design. Valve shaft bearings shall be heavy duty bronze.

- D. All butterfly valves shall be provided with an integral manual operator with a two (2") inch square (4 sided) operating nut which shall open turning left (counter-clockwise). The valve and operator shall be assembled for installation in a horizontal line with the main valve horizontal and the operator shaft and operating nut aligned vertically. Valve operators shall be worm gear type manufactured by Philadelphia Gear Works or approve.

02600.2.2.10 Tapping Sleeves and Valves

- A. Tapping sleeves shall be cast iron mechanical joint with one hundred and fifty (150) psi minimum working pressure, flanged valve connection, and test tap and plug.
- B. Steel sleeves with equal or greater working pressure may be substituted for cast iron. Steel sleeves shall either be one hundred (100%) percent stainless steel including bolts and nuts or shall have fusion bonded epoxy coating, twelve (12) mil minimum dry film thickness.
- C. Matching gate valve for tapping sleeve shall meet requirements for 2.05 above, except valve shall be mated to tapping sleeve by manufacturer. Valve shall be provided with flange connection to tapping sleeve and mechanical joint connection to branch line. Valve shall also have proper internal dimensions to allow passage of cutter head for full nominal pipe diameter tap on existing main.

02850.2.2.11 Ball Valves

- A. All ball valves shall be of the tight-closing, shaft-mounted type that fully comply with AWWA Standard C507, latest edition. Design pressure ratings shall be 150 psi and provide tight shutoff against flow in both directions. Design of valve shall be such that with the valve in the open position, the full and unobstructed circular inlet and outlet port diameter shall be as specified in Table 2 of AWWA Standard C507, latest edition. With the valve in the closed position, the rubber seated valve shall be bubble tight at rated pressure.
- B. The valve body shall have integral support legs or pads and shall consist of two body end pieces and a center body piece through-bolted and O-ring-sealed against leakage. All body pieces shall be of cast iron ASTM A126 Class B, latest edition. Minimum body thickness shall be as specified in Table 3 of AWWA Standard C507, latest edition. Flanges

shall be flat-faced and flange drilling shall be in accordance with ANSI B16.1, Class 125, latest edition.

- C. The valve ball shall be constructed of ductile iron ASTM A536 65-45-12, latest edition, or cast iron ASTM A48 Class 40, latest edition, and shall be taper-pinned to an upper and lower fitted shaft of 18-8 Type 304 or 17-4 Type 630 stainless steel. Valves employing chromium-plated iron or steel shafts or trunnions shall not be accepted.
- D. The center section shall be fitted with sleeve-type bearings contained in the body hubs. Bearings shall be corrosion resistant and self-lubricating. material shall be Teflon-lined with fiberglass backing. Bearing surfaces shall be isolated from flow by O-ring type seals. The ball assembly shall be supported by a two-way thrust bearing assembly consisting of a stainless steel stud and thrust collar in a grease-packed cavity.
- E. All seats shall be of a synthetic rubber compound. Seats shall be retained in the valve body by mechanical means without retaining rings, segments, screws or hardware of any kind in the flow stream. Seats shall seal a full 360° without interruption and have a plurality of grooves mating with a spherical stainless steel seating surface on the ball. Valve seats shall be field adjustable around the full 360° circumference and replaceable without dismantling the operator, ball or shaft. Where line size permits, seats shall also be capable of being adjusted without removing the valve from the line. Manufacturer shall certify that the rubber seat is field adjustable and replaceable.
- F. Double-seated valves shall have two sets of ball and body seats. The double-seated valve shall provide drop-tight closure in both flow directions.
- G. Valve actuators shall conform to the operating requirements of AWWA Standard C507, latest edition, and shall be designed to hold the valve in any intermediate position between full-open and full-closed without creeping or fluttering.
- H. Where shown on the Drawings manual actuators shall be of the traveling nut, self-locking type and shall be equipped with mechanical stop-limiting devices to prevent over-travel of the ball in the open or closed positions. Actuators shall be fully enclosed and designed to produce specified torque with a maximum pull of 80 lb. on handwheel, or chainwheel, as the case may be as shown on the Drawings, and a maximum input of 150 ft.-lbs. on operating nuts. Actuator components shall withstand an input torque of 450 ft.-lbs. at extreme actuator positions without damage.

- I. Where shown on the Drawings cylinder actuators shall move the valve to any position from full-open to full-closed when a maximum of 75 psi or a minimum of 30 psi water pressure is applied to the cylinder. All wetted parts of the cylinder shall be corrosion resistant and cylinder rods shall be chromium-plated stainless steel. Cylinders furnished with enclosed operating mechanisms shall have all wetted parts constructed of non-metallic materials except the cylinder rod which shall be chromium-plated stainless steel. Rod seals shall be of the non-adjustable wear-compensating type. A rod wiper for removing deposits inside the cylinder shall be provided in addition to the external dirt wiper. Cylinder actuators of this type shall be Pratt MDT with Dura-Cyl cylinder.
- J. All ball valves shall be subjected to hydrostatic, shop leakage and performance tests as specified in Section 5.2 of AWWA Standard C507, latest edition.
- K. All internal cast or ductile iron surfaces, except finished or bearing surfaces, shall be shop painted with two coats of asphalt varnish conforming to Federal Specification TT-C-494, latest edition.
- L. All exterior steel or cast or ductile iron surfaces of each valve, except finished or bearing surfaces, shall be shop painted with one or more coats of Alkyd primer. Buried service valves shall be shop painted with two (2) coats of asphalt varnish per Federal Specification TT-C-494, latest edition.
- M. The manufacturer furnishing valves under this specification shall be prepared to show that the valves proposed meet the proof of design requirements of AWWA Standard C507, Section 5.3, latest edition.

02600.2.2.13 Check Valve

- A. Check valve shall be iron body, bronze mounted swing type with flanged ends manufactured in accordance with AWWA C508.
- B. Check valve shall have cast iron clapper with bronze face and bronze seat ring. Check valve shall provide "full flow," clear passageway for nominal diameter of pipe when fully open.
- C. Valves shall have adjustable external lever and weight or lever and spring operation. Working parts of valve shall be fully removable through top cover.
- D. Valves shall be rated for one hundred and seventy-five (175) psi minimum working pressure [three hundred (300) psi test pressure].

- E. Valve shall be fully bituminous or epoxy coated for use in potable water systems.
- F. The valve shall be housed in a precast manhole or vault approved by the Engineer. All locations for check valves shall be shown on the Plans or directed by the Engineer.

02600.2.2.14 Backflow Protection Assembly

A. General

1. All backflow protection assemblies shall be approved by both the Division of Environment Health of the NC Department of Environment, Health, and Natural Resources and the Foundation For Cross-Connection Control and Hydraulic Research at the University of Southern California.
2. All backflow protection assemblies shall be the detector type provided with a 3/4" By-pass Meter. By-pass meter shall be manufactured in accordance with AWWA C700 and register units in Cubic Feet.
3. Gate valves for backflow assemblies on fire sprinkler supply lines shall be supplied with Outside Stem and Yoke (OS&Y) Operators.

B. Double Check Valve Type

1. Double check valve type backflow assemblies shall be manufactured in accordance with AWWA C511.

C. Reduced Pressure Zone Type

1. Reduced pressure zone (or principle) type backflow assemblies shall be manufactured in accordance with AWWA C512.

02600.2.2.15 Air Release Valve

- A. Air release valves shall be two (2") inch Crispin Pressure Air Valves Model P 20 with a vacuum check unit or an approved equal. These valves shall be suitable for pressure operating range of zero (0) to one hundred and fifty (150) psi working pressure and designed to allow air to escape automatically while the main is in service and under pressure.

- B. The valve shall be housed in a precast manhole approved by the Engineer. Location(s) for air release valves shall be shown on the Plans or directed by the Engineer.
- 02600.2.3 Meter Boxes (5/8" X 3/4" & 1")
- A. Meter boxes shall be the Crescent Box manufactured by Ford Meter Box Co., or approved equal. Meter box shall include bituminous coated, cast iron base, inner barrel, outer barrel, and lid. Box shall also be provided with inlet valve, clamping device, and outlet connection meeting requirements of AWWA C800 for brass waterworks. Inlet and outlet connections shall be supplied with compression couplings for three-quarter (3/4") inch copper tubing.
- 02600.2.4 Corporation & Curb Stops
- A. Corporation and curb stops shall be brass manufactured in accordance with AWWA C800.
 - B. Corporation stop shall be Hayes 5040, Mueller H-15175, or approved equal.
 - C. Curb stop shall be Ford F600, Hayes 5200, Mueller H-15000, or approved equal.
- 02600.2.5 Valve Boxes
- A. All valve boxes shall conform to Standard Detail Drawings 4.7 and 4.7A in Section 02660 Water Mains of the City of Rocky Mount Manual of Specifications, Standards, and Design.
 - B. Valve boxes shall be made of cast iron conforming to ASTM A48, Class 30, shall have a telescoping adjustment feature, and shall be fully bituminous seal coated.
 - C. All valve boxes shall be set to grade with a Class A (3000 psi minimum) concrete pad with two (2') foot by two (2') foot by six (6") inch deep dimensions poured around the box.
- 02600.2.6 Steel Encasement Pipe
- A. Steel encasement pipe shall be welded or seamless, consisting of grade "B" steel with a minimum yield strength of thirty-five thousand (35,000) psi and manufactured in accordance with ASTM A139. Pipe thickness shall be as shown on plans or as indicated in the Bid Schedule, but shall be a minimum of one quarter (0.250") inch.

- B. All pipe shall be furnished with beveled ends prepared for field welding of circumferential joints. All burs at pipe ends shall be removed.
 - C. Encasement pipe must be approved by the appropriate controlling agency (NCDOT, Railroad, etc.) prior to ordering.
- 02600.2.7 Cast-In-Place Concrete
- A. Cast-In-Place Concrete shall be provided in accordance with Section 02271.
- 02600.2.8 Unit Masonry
- A. Unit Masonry shall be provided in accordance with Section 02271.
- 02600.2.9 Pre-Cast Manholes & Vaults
- A. Pre-Cast Manholes shall be provided in accordance with Section 02800, Sanitary Sewer Collection System Improvements.
 - B. Pre-Cast Vaults shall be designed and constructed in accordance with the appropriate AASHTO and ASTM Standards. Where vault may be exposed to vehicular loadings, the vault shall be designed to carry the appropriate loading such as HS-15, HS-20, E-80, HL-93, etc.
- 02600.3.0 EXECUTION
- 02600.3.1 General
- A. All pipe, valves, fittings, hydrants, vaults, castings, and other appurtenances shall be kept clean and carefully handled to avoid damage and shall be inspected by the Engineer or his representative prior to installation.
 - B. The Contractor shall install temporary watertight plugs in water mains and services during construction to prevent ground water contamination. At a minimum, the pipes shall be plugged at the end of each workday.
- 02600.3.2 Project Control
- A. The Contractor shall be responsible for constructing a minimum of two (2) project control monuments as specified hereinafter and shall be field located by the Engineer. All monuments shall be constructed of concrete poured in-place into a 5" bored or dug hole in the ground or be precast concrete at least four (4) inches in diameter or square, each not less than

three (3) feet in length and installed with the top flush with the finished ground. Each monument shall have a standard metal plate imbedded in its top of non-corrodible material marked plainly with the bench point, the monument number and identified as a part of the City of Rocky Mount Geodetic Control System. The project control monuments shall be located on the street right of way to facilitate construction control but may be incorporated as a property control corner. In all cases the Contractor shall protect project control monument(s) from disruption due to construction operations.

- B. The vertical and horizontal control of the project control monuments shall be established by a set-up of one (1) GPS receiver on each of any two (2) monuments simultaneously, allowing the receivers to operate a minimum of two (2) hours, and then forwarding the data collected to the National Geodetic Survey (NGS), Online Positioning User Service (OPUS) for computation of the control coordinates. If necessary the vertical coordinate shall then be adjusted to NAVD 88 and the horizontal coordinate shall be adjusted to NAD 83. The web address to use for this service is www.ngs.noaa.gov, then click on OPUS.
- C. The Contractor shall employ a qualified Registered Land Surveyor to establish horizontal and vertical coordinates for each project control monument with a precision of 1:100,000. The horizontal and vertical coordinate information shall be recorded in a bound field book used exclusively for this project and the coordinate and elevation information immediately reported to the City Engineer when it becomes available for each project control monument individually.

02600.3.3 Construction Stake-Out and Records

- A. The Contractor shall be responsible for the stake-out of the water distribution system improvements. The Contractor shall employ a field party to stake-out the water distribution system improvements. The stake-out field party shall be of a sufficient size to carry out the work and shall be under the personal direction of a competent party chief who is experienced with this class of work. The minimum cover of the water pipe shall be three (3') feet in accordance with the Drawings and the Engineers requirements under them. Excavation of the bottom of the pipe trench shall be located using laser equipment, off-set grade hubs with cut-sheets or other approved method. All station and elevation information relative to construction of the water distribution system improvements shall be referenced to the project control monuments and recorded in the bound project field book required under Section 02800.3.2, paragraph C., above.

- B. The Contractor shall establish two permanent benchmarks such as fire hydrants or nails in power poles at each intersection based on the project control monuments. These permanent benchmarks shall have a minimum precision of 1:10,000. After each days work and prior to backfill, the Contractor shall be responsible for the location and tie-in to permanent benchmarks the centerline station and location of each water line, valve, hydrant, house service, or other appurtenance based on the Drawings. The horizontal location can be made by the Contractor's superintendent, pipe foreman or the stake-out field party using a surveyors tape. All such location work shall be to the satisfaction of the Engineer responsible for preparing the Record Drawings. Vertical information about the water line can be included on the drawings as data only. All such construction record information relative to the constructed water distribution system improvements shall be recorded in the bound project field book required under Section 02800.3.2, paragraph C., above.
- C. Upon completion of the project construction operations the Contractor shall employ a qualified Registered Land Surveyor to verify that the required precision of 1:100,000 has been maintained for each project control monument. After confirmation that the project control monument precision is satisfactory, the Party Chief shall check and verify his field measurements in the bound project field book. When satisfied with the accuracy of his field measurements the Party Chief shall make available to the Engineer the bound project field book and any work Drawings he may have. The Engineer will rely heavily on the information contained in these documents in order to verify construction record information. Based on these field measurements the Engineer will then revise the Final Drawings to conform to construction records.

02600.3.4 Trenching

- A. Trench excavation, backfill, and compaction shall be performed in accordance with Sections 02225 and 02229, Trench Excavation, Backfill and Compaction and Rock Excavation respectively.

02600.3.5 Pipe Installation

- A. Install pipe, valves, hydrants, fittings, services, and other accessories in accordance with Plans, Specifications, and Detail Drawings.
- B. A minimum of three (3') feet of cover shall be provided on all main installations. Depth of cover shall be increased to four (4') feet at ditch, creek, or river crossings.
- C. The Contractor shall install all valves in the flanged piping system in accordance with AWWA Standard M-11, latest edition, in order to prevent

any undue piping stresses, deflection or bending that may effect the performance of valves, pumps or other equipment

02600.3.6 Relationship of Water Mains to Other Utilities

- A. Water mains shall be laid at least ten (10') feet laterally from sanitary sewer mains. In cases where local conditions or barriers prevent a ten (10') foot lateral separation, the following shall apply:
 - 1. The water and sewer mains shall be laid in separate trenches, with the elevation of the bottom of the water main at least eighteen (18") inches above the top of the sewer; or
 - 2. The water main is laid in the same trench as the sewer with the water main located at one side of the trench on a bench of undisturbed earth and with the elevation of the bottom of the water main at least eighteen (18") inches above the top of the sewer.
- B. Whenever it is necessary for a water main to cross over a sewer, the sewer main shall be laid at such an elevation that the bottom of the water main is at least eighteen (18") inches above the top of the sewer. If local conditions or barriers prevent an eighteen (18") inch vertical separation, then both the water main and sewer main shall be constructed of or replaced with ductile cast iron pipe and shall have joints that are equidistant from the point of crossing.
- C. Whenever it is necessary for a water main to cross under a sewer main, both the sewer main and the water main shall be constructed of or replaced with ductile cast iron pipe and shall have joints that are equidistant from the point of crossing.
- D. Whenever it is necessary for a water main to cross over or under any utility other than sewer, a minimum vertical separation of six (6") inches shall be maintained and an approved backfill material shall be used as cushioning material.

02600.3.7 Existing and Proposed Services

- A. A water service shall be provided at every recorded lot of record, every existing dwelling unit, or directed by the Engineer. In cases where large undeveloped or agricultural tracts of land have frontage along the proposed water main, the Engineer may opt to delete or omit services to these large tracts of land as part of this Contract.
- B. Unless otherwise noted on Drawings or directed by Engineer, all water services shall be a three quarter (3/4") inch tap including but not

specifically limited to: corporation stop; tapping saddle where necessary; three quarter (3/4") inch service piping; Ford Crescent or Approved Equal three piece, adjustable, cast iron meter box; two (2) each end connectors; brass clamping device; one (1) cubic foot crushed stone; etc. per Standard Drawings 4.8 and 4.9 of the Manual and these Specifications. Tapping saddles shall be solid brass type and shall be required where the main being tapped is either not ductile iron pipe or less than four (4") inches in diameter. All Meters shall be supplied by and set by the City of Rocky Mount at No Additional Charge to the Contractor. Initial meter readings and service start up shall be performed by City. All other installation necessary for a complete and functional service tap including setting of meter box to finish grade shall be supplied by the Contractor as part of the Unit Price(s) for Services. The Contractor shall also be responsible for location tie-down and "Record Drawings" of All Meter Box Locations.

C. Service Connections:

1. All house connections shall be laid to the Right of Way Line, Easement Line, shown on the Drawings, or directed by the Engineer.
2. Where an existing service is in place, the Contractor shall tie-in the existing service to the new system.
3. Where the property owner is not currently served by City water, the Contractor shall install a service to the property line as close as possible to the existing well, house lead to local system, hose bib at front of house, or directed by the Engineer.
4. For services in new subdivisions, water and sewer service taps should be installed centered on the lot with 3'-5' separation between the water meter box and sewer cleanout. Services may be shifted off center for lots with narrow frontages such as lots at the ends of cul-de-sacs.

02600.3.8 Tie-In to Existing Water System

- A. Prior to actual cutting of an existing main for installation of a tapping sleeve and valve "wet tap", the tapping sleeve and valve shall be pressure tested in place in the presence of the Engineer or his representative. Upon completion of tap, the portion of main removed for tap shall be presented to the Engineer or his representative for inspection.
- B. Prior to filling of lines, flushing, chlorinating, etc., approval shall be obtained from Engineer and City of Rocky Mount Water Treatment Plant Supervisor in accordance with Sections 02661 and 02662 for Testing of

Water Distribution System and Disinfection of Water Distribution System respectively.

- C. No lines shall be placed into service until the following written approvals have been issued:
 - 1. Engineer's Certification stating that the water lines and appurtenances have been installed in accordance with Plans, Specifications, and the DENR Approved Permit.
 - 2. Water Treatment Plant Supervisor's Approval stating that a Negative Bacteriological Contamination Test Result has been obtained or a Negative Bacteriological Contamination Test Result has been obtained from a State Certified Laboratory.
- 02600.3.9 Testing of Water Distribution System
- A. Water Distribution System shall be tested in accordance with Section 02661.
- 02600.3.10 Disinfection of Water Distribution System
- A. Water Distribution System shall be disinfected, sampled, and tested in accordance with Section 02662.
- 02600.3.11 Cleanup
- A. Prior to release of final payment or acceptance by City for ownership and maintenance, all areas disturbed by construction including but not limited to paved areas; vegetated areas; driveways; signs; mailboxes; fences; utilities; on-site or off-site areas used for access, storage, borrow, or spoil; etc. shall be left in or repaired to as good as or better than existing condition prior to start of construction.

END OF SECTION 02600